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(54) 【発明の名称】 有機性汚泥の処理方法

(57) 【要約】

【課題】 汚泥中の固形分の一部成分を、きわめて短時間で溶融し、固形分の量を減らすと同時に、脱水性を向上させ、脱水ケーキの含水率を低下させる。

【解決手段】 シュードモナス属に属するシュードモナス プチダとシュードモナス フルオレッセンスの菌種から選ばれる少なくとも1種から成る微生物の代謝物を含む培養液を汚泥に添加して汚泥組成の一部を液状化した後、高分子凝集剤を添加混合して脱水する。

## 【特許請求の範囲】

【請求項 1】有機性汚泥中の非水溶性成分を分解する能力を備えた酵素を含有した微生物代謝物を含む培養液を汚泥に添加して汚泥組成の一部を液状化した後、高分子凝集剤を添加混合して脱水することを特徴とする有機性汚泥の処理方法。

【請求項 2】シュードモナス属に属するシュードモナス プチダとシュードモナス フルオレッセンスの菌種から選ばれる少なくとも 1 種から成る微生物の代謝物を含む培養液を汚泥に添加して汚泥組成の一部を液状化した後、高分子凝集剤を添加混合して脱水することを特徴とする有機性汚泥の処理方法。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】本発明は、各種産業廃水、下水、し尿等の廃水処理施設の工程から発生する、余剰汚泥、消化汚泥等の各種有機性汚泥の処理方法に係り、すなわち、有機性汚泥を脱水ケーキとして処理する方法に関するものである。

## 【0002】

【従来の技術】下水処理場、し尿処理場、一般工場（食品、ビール、紙パルプ等の工場）の廃水処理施設では、有機物を含む廃水を処理するために多くの場合、生物処理法の 1 つである活性汚泥法が用いられている。

【0003】そして、活性汚泥法を用いることにより、前記各処理施設からは、大量の有機性汚泥（余剰汚泥、生汚泥、消化汚泥等）が発生し、排出される。その量は、下水処理施設だけで 200 万トン／年以上と言われており、さらに近年は汚泥の海洋投棄の抑制が必要とされ増加傾向にある。これらの大量に発生する汚泥の処理が大問題となっている。

【0004】しかして、汚泥粒子表面には汚泥菌が産出した両性電解質である蛋白質があり、これらが（一）電荷を得ながら安定に分散しており、汚泥にカチオン系高分子電解質ポリマーを添加することにより、架橋作用により、フロックを形成し、前述の電荷を中和し、タンパク質を疎水化の方向に変化させ、水ぎれを良くし、より汚泥の含水率を下げるができるため、現在、これらの汚泥は高分子凝集剤を添加し、調整した後、遠心分離機、ベルトプレス、フィルタープレス、スクリュープレス等の脱水機で脱水した後、脱水ケーキ（含水率 70～85% 程度）として、ごく一部建設資材として再利用されているのを除いて、埋立処分又は焼却処分している。

## 【0005】

【発明が解決しようとする課題】高分子凝集剤は、わずかな添加量で劇的な脱水効果を得ることができ、今日、汚泥処理には、欠かすことができない製品となっているが、高分子凝集剤を用いて得た脱水ケーキの処分が、現状では埋立処分場の不足や、焼却用重油コスト、CO<sub>2</sub>削減、焼却灰の処理等多くの問題をかかえている。

【0006】このため、処理施設より排出される脱水ケーキの量をいかに減量化するかが重要な問題になっている。

【0007】本発明はこの様な状況のもとで、下水、し尿又は、一般産業廃水処理から発生する有機性汚泥の脱水ケーキの量を低減できる処理方法を提供することを目的とする。

## 【0008】

【課題を解決するための手段】本発明は、下水処理場、し尿処理場、一般工場の廃水処理施設から発生する有機性汚泥に対して、シュードモナス (*Pseudomonas*) 属に属するシュードモナス プチダ (*Pseudomonas Putida*) とシュードモナス フルオレッセンス (*Pseudomonas Fluorescens*) の菌種から選ばれる少なくとも一種よりなる微生物を培養した微生物代謝物を含む培養液を有機性汚泥に添加して酵素分解操作をした後、高分子凝集剤を添加混合して脱水ケーキと成すのである。

【0009】具体的な微生物としてシュードモナス プチダ (*Pseudomonas Putida*) sp. NRRL-B-12538、シュードモナス プチダ (*Pseudomonas Putida*) sp. NRRL-B-12539 およびシュードモナス フルオレッセンス (*Pseudomonas Fluorescens*) NRRL-B-18296 が挙げられ、これらの微生物を培養する培地としては、好気性グラム陰性菌を培養するための一般的な培地が使用できるが、以下の割合よりなるものが好ましい。

## 【0010】

ポリペプトン	0.1～10g
酵母エキス	0.1～5g
塩化ナトリウム	0～2.5g
リン酸水素カリウム	0～2.5g
滅菌水	50～225g

培養条件としては、攪拌下に空気又は酸素を導入して、液温 5°C～35°C の範囲好ましくは、20°C～30°C の範囲で 10 時間～200 時間程度培養を行なうのが好ましい。前記微生物培養液を前記各種汚泥に添加することにより、汚泥粒子固形分中の一部を溶解し、水溶液とする。このことにより液相の着色が観察される。

【0011】処理汚泥を遠心分離又は、濾過により、固液分離した場合、脱水ケーキの重量が未処理汚泥の場合より減少する。

【0012】これは、汚泥中の固形分が一部溶解し、残る固形物が減少したこと、及び脱水性が改善され脱水ケーキの含水率が向上することの両作用があると考えられる。これらの作用については、今後詳しい解明が必要だが、微生物の代謝物中の酵素の働き、又、他の代謝生成物の働きにより、汚泥中の有機物が酸化分解されているものと考えられる。

【0013】又、この時、同時に汚泥の悪臭成分である硫化水素やメチルメルカプタンも分解、中和していることが観察される。

【0014】なお、本発明に用いる微生物の代謝物として前記の通りシュドモナス プチダ等の具体例を挙げたが、たん白質、脂質、炭水化物、セルロース等の有機汚泥中の非水溶性成分を分解する能力を備えた酵素を含有した微生物の代謝物であれば、本発明の目的を達成し得るものと思われる。

【0015】

【実施例】以下に実施例を挙げ本発明を具体的に説明する。

【0016】培養液の作成例……培養液①

Manox 112 \* 6 g  
ポリペプトン 12 g  
酵母エキス 6 g  
塩化ナトリウム 3 g  
リン酸水素カリウム 3 g  
蒸留水 270 g

\* 米国 Osprey 社商品名 (Pseudomonas Putida 及び Pseudomonas Fluorescens)

あらかじめ培地を滅菌した上記組成物を、内容量 500 ml の攪拌機つきガラス製培養ビン (ミニファーマンター) に仕込み滅菌空気を導入し、攪拌下に 29°C で 4

(濾過データ)

	時間	ケーキ重量 (g)	濾液重量 (g)	備考
処理汚泥 (培養液①10g添加)	7 H	43.8	226.2	濾液は透明な 黄色に着色
	24 H	43.6	226.4	
Control汚泥 (蒸留水10g添加)	7 H	46.0	224.0	濾液は透明
	24 H	45.8	224.2	

【0020】

【表2】

(遠心分離データ)

	ケーキ重量 (g)	分離液重量 (g)	備考
処理汚泥 (培養液①10g添加)	4.571	35.429	分離液は透明な黄色に着色
Control汚泥 (蒸留水10g添加)	4.901	35.099	分離液は透明

【0021】

【実施例2】B下水処理場余剰汚泥 (PH=7.57、SS=13280 ppm、T. S. =1.6%、アルカリ度=3850、有機物=67.5%、無機物=32.5%) を 200.00 g ビーカーに採取し、培養液①を 10.00 g (Control は蒸留水を 10.00 g) 添加し、20°C で 24 時間放置後、0.1% 高

日間培養した。この培養液を遠心分離し、菌体を取り除き、分離液をさらにメンブランフィルターで濾過した。限外濾過装置を通し、分画分子量 1 万以下の培養液-①を得た。

【0017】

【実施例1】A下水処理場余剰汚泥 (PH=4.63、SS=14580 ppm、T. S. =1.65%、アルカリ度1010、有機物77.6%、無機物22.4%) を 200.00 g ビーカーに採取し、培養液①を 100.00 g (Control は蒸留水を 10.00 g) 添加し、20°C で 24 時間放置後、0.1% 高分子凝集剤水溶液 (コーナンフロック K-53P、メタクリル酸エステル 100 モル%) を 60.00 g 添加しスリーワンモーターで 50 r. p. m で 3 分間攪拌調整後、ADVANTEC 社製 No. 1 濾紙 (90 mm) を用いて濾過し、7 時間後及び 24 時間後の濾液重量とケーキ重量を測定した。

【0018】次に同様に処理した汚泥をポリプロピレン製遠沈管に 40.00 g 正確に測りとり、遠心分離機で 10000 r. p. m で 5 分間遠心分離し、ケーキと分離液の重量を測定した。(この場合は、高分子凝集剤は添加しない)

【0019】

【表1】

子凝集剤水溶液 (コーナンフロック K-53P、メタクリル酸エステル 100 モル%) を 60.00 g 添加し、スリーワンモーターで 50 r. p. m. で 3 分間攪拌調整後、ADVANTEC 社製 No. 1 濾紙 (90 mm) を用いて濾過し、7 時間後及び 24 時間後の濾液重量とケーキ重量を測定した。次に同様に処理した汚泥をポリプロピレン製遠沈管に 40.00 g 正確に測りとり遠心

分離機で10000 r. p. m. で5分間遠心分離しケーキと分離液の重量を測定した。(この場合は、高分子凝集剤は添加しない) 【0022】  
【表3】

(濾過データ)

	時間	ケーキ重量 (g)	濾液重量 (g)	備考
処理汚泥 (培養液①10g添加)	7H	60.1	209.9	濾液は透明な 黄色に着色
	24H	58.2	211.8	
Control汚泥 (蒸留水10g添加)	7H	62.0	208.0	濾液は透明
	24H	60.8	209.2	

【0023】

【表4】

(遠心分離データ)

	ケーキ重量 (g)	分離液重量 (g)	備考
処理汚泥 (培養液①10g添加)	7.401	32.599	分離液は透明 な黄色に着色
Control汚泥 (蒸留水10g添加)	7.593	32.407	分離液は透明

【0024】

【発明の効果】汚泥中の固形分の一部成分を、きわめて短時間で溶解し、固形分の量を減らすと同時に、脱水性

を向上させ、脱水ケーキの含水率を低下させることができ、しかも、後工程に悪影響がなく二次公害の心配のない有機性汚泥の処理方法を提供できる。

## PATENT ABSTRACTS OF JAPAN

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## (54) TREATMENT OF ORGANIC SLUDGE

## (57)Abstract:

PROBLEM TO BE SOLVED: To reduce the amt. of a solid by melting a part of the components of the solid in sludge within an extremely short time not only to enhance dehydration properties but also to lower the water content of a dehydrated cake.

SOLUTION: A culture soln. containing metabolites of microorganisms comprising at least one kind of a strain selected from *Pseudomonas putida* and *Pseudomonas fluorescence* belonging to the genus *Pseudomonas* is added to sludge to liquefy a part of a sludge compsn. and, thereafter, a polymeric flocculant is added to and mixed with this sludge compsn. to dehydrate sludge.

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CLAIMS

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## [Claim(s)]

[Claim 1] The art of the organic sludge characterized by carrying out addition mixing of the polymer coagulant, and dehydrating after adding to sludge the culture medium containing the microorganism metabolite containing the enzyme equipped with the capacity which decomposes the nonaqueous solubility component in organic sludge and liquefying in a part of sludge presentation.

[Claim 2] Pseudomonas belonging to Pseudomonas PUCHIDA and Pseudomonas Art of the organic sludge characterized by carrying out addition mixing of the polymer coagulant, and dehydrating after adding to sludge the culture medium containing the metabolite of the microorganism which consists of at least one sort chosen from the strain of full ORESSENSU and liquefying in a part of sludge presentation.

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[Translation done.]

## DETAILED DESCRIPTION

## [Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the approach of starting the art of the various organic sludge [ such as excess sludge and digested sludge, ] generated from the process of a waste-water-treatment facility, such as various industrial waste water, sewage, and nightsoil, namely, processing organic sludge as a cake.

[0002]

[Description of the Prior Art] In the waste-water-treatment facility of a sewage disposal plant, a human waste treatment plant, and general works (works, such as food, Biel, and paper pulp), in order to process the waste water containing the organic substance, in many cases, the activated sludge process which is one of the biological treatment is used.

[0003] And by using an activated sludge process, from said each treatment facility, a lot of organic sludge (excess sludge, a raw sludge, digested sludge, etc.) is generated, and is discharged. The amount is said in 2 million t/year or more only in the sewage treatment equipment, and further, control of ocean dumping of sludge is needed and it is increasing in recent years. Processing of these sludge generated in large quantities poses a big problem.

[0004] By carrying out a deer and the protein which is an amphoteric electrolyte which the sludge bacillus produced being shown in a sludge particle front face, distributing to stability, while these obtain the (-) charge, and adding a cation system polyelectrolyte polymer to sludge Since flocks can be formed, the above-mentioned charge can be neutralized, protein can be changed in the direction of hydrophobing, \*\*\*\*\* can be improved and the water content of sludge can be lowered more according to a bridge formation operation, After adding and adjusting a high polymer coagulant and dehydrating with dehydrators, such as a centrifugal separator, a belting press, the filter press, and a screw press, current and these sludge as a cake (about 70 - 85% of water content) very — a part — being reused as a construction material — removing — a landfill — or incineration disposal is carried out.

[0005]

[Problem(s) to be Solved by the Invention] Disposal of the cake obtained using the polymer coagulant although the polymer coagulant could acquire the dramatic dehydration effectiveness with few additions and had become the product it is [ a product ] indispensable to a sludge disposal today is lack of a landfill place, and the fuel oil cost for incineration and CO2 in the present condition. It has many problems, such as reduction and processing of incinerated ash.

[0006] For this reason, it has been an important problem how the amount of the cake discharged from a treatment facility is streamlined.

[0007] This invention is the basis of such a situation and it aims at offering the art which can reduce the amount of the cake of sewage, nightsoil, or the organic sludge generated from general industrial waste water treatment.

[0008]

[Means for Solving the Problem] This invention is Pseudomonas belonging to the Pseudomonas (Pseudomonas) group to the organic sludge generated from the waste-water-treatment facility of a sewage disposal plant, a human waste treatment plant, and general works. PUCHIDA (Pseudomonas Putida) and Pseudomonas After adding the culture medium containing the microorganism metabolite which cultivated the microorganism which is chosen from the strain of full ORESSENSU (Pseudomonas Fluorescens), and which consists of a kind at least to organic sludge and carrying out zymolysis actuation, addition mixing of the polymer coagulant is carried out, and it accomplishes with a cake.

[0009] It is Pseudomonas as a concrete microorganism. PUCHIDA (Pseudomonas Putida) sp.NRRL-B -12538, Pseudomonas PUCHIDA (Pseudomonas Putida) sp.NRRL-B -12539 and Pseudomonas Although the general culture medium for cultivating an aerobic gram negative can be used as a culture medium which full ORESSENSU (Pseudomonas Fluorescens) NRRL-B -18296 is mentioned, and cultivates these microorganisms, what consists of the following rates is desirable.

[0010]

The poly peptone 0.1-10g yeast extract 0.1-5g sodium chloride 0-2.5g phosphoric-acid hydrogen potassium 0-2.5g sterilized water as 50-225g culture condition — the bottom of churning — air or oxygen — introducing — the range of 5 degree C-35-degreeC of solution temperature — it is desirable preferably to cultivate in the range of 20-degreeC-30-degreeC for 10 hours to about 200 hours. By adding said microorganism culture medium to said various sludge, the part in sludge particle solid content is fused, and it considers as a water solution. Coloring of the liquid phase is observed by this.

[0011] When solid liquid separation of the processing sludge is carried out by centrifugal separation or filtration, it decreases from the case where the weight of a cake is unsettled sludge.

[0012] It is thought that this has both operations of that a part of solid content in sludge dissolved, and \*\*\*\*\* to leave decreased and dehydration nature being improved and the water content of a cake improving. These operations are considered that oxidative degradation of the organic substance in sludge is carried out by work of the enzyme in the metabolite of a microorganism, and work of other metabolite, although an elucidation detailed from now on is required.

[0013] Moreover, also decomposing and neutralizing to coincidence the hydrogen sulfide and methyl mercaptan which are the offensive odor component of sludge is observed at this time.

[0014] In addition, it is as aforementioned Pseudomonas as metabolite of a microorganism used for this invention. Although examples, such as PUCHIDA, were given, if it is metabolite of the microorganism containing the enzyme equipped with the capacity which decomposes the nonaqueous solubility component in organic sludge, such as protein, a lipid, a carbohydrate, and a cellulose, it will be thought that the purpose of this invention can be attained.

[0015]

[Example] An example is given to below and this invention is concretely explained to it.

[0016] Example of creation of culture medium ..... Culture medium \*\*Manox112 \* 6g poly peptone 12g yeast extract 6g sodium chloride 3g phosphoric-acid hydrogen potassium 3g distilled water 270g\* U.S. Osprey trade name (Pseudomonas Putida and Pseudomonas Fluorescens)

The above-mentioned constituent which sterilized the culture medium beforehand was taught to the glass culture bottle (mini fur mentor) with an agitator of 500ml of inner capacity, sterilization air was introduced, and it cultivated for four days by 29-degreeC under churning. Centrifugal separation of this culture medium was carried out, the fungus body was removed, and the supernatant liquid was further filtered with the noodle plan filter. Through and 10,000 or less-cut off molecular weight culture

medium-\*\* were obtained for the ultrafiltration equipment.

[0017]

[Example 1] A sewage disposal plant excess sludge (PH=4.63 and SS= — 14580 ppm) T. An alkali level 1010, 77.6% of organic substance, and 22.4% of inorganic substances are extracted to 200.00g beaker S.=1.65%. 10.00g (Control is 10.00g about distilled water) addition of the culture medium \*\* is carried out. They are after 24-hour neglect and 0.1% polymer coagulant water solution (K-53 ps of KONAN flocks) at 20-degreeC. 60.00g 100 mol % of methacrylic ester was added, it filtered [ by the three one motor ] after churning adjustment using No.1 made from ADVANTEC filter paper (90mm) for 3 minutes by 50r.p.m, and the filtrate weight and cake weight of 7 hours and 24 hours after were measured.

[0018] Next, the sludge processed similarly was measured to the centrifugation tube made from polypropylene at 40.00g accuracy, at-long-intervals alignment separation was carried out by 10000r.p.m with the centrifugal separator for 5 minutes, and the weight of a cake and a supernatant liquid was measured. (In this case, a polymer coagulant is not added)

[0019]

[Table 1]

(濾過データ)

	時間	ケーキ重量 (g)	濾液重量 (g)	備考
処理汚泥 (培養液①10g添加)	7 H	43.8	226.2	濾液は透明な 黄色に着色
	24 H	43.6	226.4	
Control汚泥 (蒸留水10g添加)	7 H	46.0	224.0	濾液は透明
	24 H	45.8	224.2	

[0020]

[Table 2]

(遠心分離データ)

	ケーキ重量 (g)	分離液重量 (g)	備考
処理汚泥 (培養液①10g添加)	4.571	35.429	分離液は透明 な黄色に着色
Control汚泥 (蒸留水10g添加)	4.901	35.099	分離液は透明

[0021]

[Example 2] B sewage disposal plant excess sludge (PH=7.57 and SS= — 13280 ppm) T. S.=1.6%, alkalinity =3850, organic substance =67.5%, Inorganic substance = Extract 32.5% to 200.00g beaker, and 10.00g (Control is 10.00g about distilled water) addition of the culture medium \*\* is carried out. They are after 24-hour neglect and 0.1% polymer coagulant water solution (K-53 ps of KONAN flocks) at 20-degreeC. 60.00g 100 mol % of methacrylic ester was added, it filtered [ by the three one motor ] after churning adjustment using No.1 made from ADVANTEC filter paper (90mm) for 3 minutes in 50r.p.m., and the filtrate weight and cake weight of 7 hours and 24 hours after were measured. Next, the sludge processed similarly was measured to the centrifugation tube made from polypropylene at 40.00g accuracy, at-long-intervals alignment separation was carried out in 10000r.p.m. with the centrifugal separator for 5 minutes, and the weight of a cake and a supernatant liquid was measured. (In this case, a polymer coagulant is not added)

[0022]

[Table 3]

(濾過データ)

	時間	ケーキ重量 (g)	濾液重量 (g)	備考
処理汚泥 (培養液①10g添加)	7 H	60.1	209.9	濾液は透明な 黄色に着色
	24 H	58.2	211.8	
Control汚泥 (蒸留水10g添加)	7 H	62.0	208.0	濾液は透明
	24 H	60.8	209.2	

[0023]

[Table 4]



## (遠心分離データ)

	ケーキ重量 (g)	分離液重量 (g)	備考
処理汚泥 (培養液①10g添加)	7.401	32.599	分離液は透明 な黄色に着色
Control汚泥 (蒸留水10g添加)	7.593	32.407	分離液は透明

[0024]

[Effect of the Invention] a part of solid content in sludge — while fusing a component extremely for a short time and reducing the amount of solid content, dehydration nature is raised, the water content of a cake can be reduced, moreover, there is no bad influence in a back process, and the art of the anxious organic sludge of a secondary public nuisance which is not can be offered.

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[Translation done.]

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**TECHNICAL FIELD**

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[Industrial Application] This invention relates to the approach of starting the art of the various organic sludge [, such as excess sludge and digested sludge, ] generated from the process of a waste-water-treatment facility, such as various industrial waste water, sewage, and nightsoil, namely, processing organic sludge as a cake.

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[Translation done.]

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PRIOR ART

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[Description of the Prior Art] In the waste-water-treatment facility of a sewage disposal plant, a human waste treatment plant, and general works (works, such as food, Biel, and paper pulp), in order to process the waste water containing the organic substance, in many cases, the activated sludge process which is one of the biological treatment is used.

[0003] And by using an activated sludge process, from said each treatment facility, a lot of organic sludge (excess sludge, a raw sludge, digested sludge, etc.) is generated, and is discharged. The amount is said in 2 million t/year or more only in the sewage treatment equipment, and further, control of ocean dumping of sludge is needed and it is increasing in recent years. Processing of these sludge generated in large quantities poses a big problem.

[0004] By carrying out a deer and the protein which is an amphoteric electrolyte which the sludge bacillus produced being shown in a sludge particle front face, distributing to stability, while these obtain the (-) charge, and adding a cation system polyelectrolyte polymer to sludge Since flocks can be formed, the above-mentioned charge can be neutralized, protein can be changed in the direction of hydrophobing, \*\*\*\*\* can be improved and the water content of sludge can be lowered more according to a bridge formation operation, After adding and adjusting a high polymer coagulant and dehydrating with dehydrators, such as a centrifugal separator, a belting press, the filter press, and a screw press, current and these sludge as a cake (about 70 - 85% of water content) very — a part — being reused as a construction material — removing — a landfill — or incineration disposal is carried out.

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[Translation done.]

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**EFFECT OF THE INVENTION**

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[Effect of the Invention] a part of solid content in sludge — while fusing a component extremely for a short time and reducing the amount of solid content, dehydration nature is raised, the water content of a cake can be reduced, moreover, there is no bad influence in a back process, and the art of the anxious organic sludge of a secondary public nuisance which is not can be offered.

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[Translation done.]

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] Disposal of the cake obtained using the polymer coagulant although the polymer coagulant could acquire the dramatic dehydration effectiveness with few additions and had become the product it is [ a product ] indispensable to a sludge disposal today is lack of a landfill place, and the fuel oil cost for incineration and CO2 in the present condition. It has many problems, such as reduction and processing of incinerated ash.

[0006] For this reason, it has been an important problem how the amount of the cake discharged from a treatment facility is streamlined.

[0007] This invention is the basis of such a situation and it aims at offering the art which can reduce the amount of the cake of sewage, nightsoil, or the organic sludge generated from general industrial waste water treatment.

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[Translation done.]

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MEANS

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[Means for Solving the Problem] This invention is Pseudomonas belonging to the Pseudomonas (Pseudomonas) group to the organic sludge generated from the waste-water-treatment facility of a sewage disposal plant, a human waste treatment plant, and general works. PUCHIDA (Pseudomonas Putida) and Pseudomonas After adding the culture medium containing the microorganism metabolite which cultivated the microorganism which is chosen from the strain of full ORESSENSU (Pseudomonas Fluorescens), and which consists of a kind at least to organic sludge and carrying out zymolysis actuation, addition mixing of the polymer coagulant is carried out, and it accomplishes with a cake.

[0009] It is Pseudomonas as a concrete microorganism. PUCHIDA (Pseudomonas Putida) sp.NRRL-B -12538, Pseudomonas PUCHIDA (Pseudomonas Putida) sp.NRRL-B -12539 and Pseudomonas Although the general culture medium for cultivating an aerobic gram negative can be used as a culture medium which full ORESSENSU (Pseudomonas Fluorescens) NRRL-B -18296 is mentioned, and cultivates these microorganisms, what consists of the following rates is desirable.

[0010]

The poly peptone 0.1-10g yeast extract 0.1-5g sodium chloride 0-2.5g phosphoric-acid hydrogen potassium 0-2.5g sterilized water as 50-225g culture condition — the bottom of churning — air or oxygen — introducing — the range of 5 degree C-35-degreeC of solution temperature — it is desirable preferably to cultivate in the range of 20-degreeC-30-degreeC for 10 hours to about 200 hours. By adding said microorganism culture medium to said various sludge, the part in sludge particle solid content is fused, and it considers as a water solution. Coloring of the liquid phase is observed by this.

[0011] When solid liquid separation of the processing sludge is carried out by centrifugal separation or filtration, it decreases from the case where the weight of a cake is unsettled sludge.

[0012] It is thought that this has both operations of that a part of solid content in sludge dissolved, and \*\*\*\*\* to leave decreased and dehydration nature being improved and the water content of a cake improving. These operations are considered that oxidative degradation of the organic substance in sludge is carried out by work of the enzyme in the metabolite of a microorganism, and work of other metabolite, although an elucidation detailed from now on is required.

[0013] Moreover, also decomposing and neutralizing to coincidence the hydrogen sulfide and methyl mercaptan which are the offensive odor component of sludge is observed at this time.

[0014] In addition, it is as aforementioned Pseudomonas as metabolite of a microorganism used for this invention. Although examples, such as PUCHIDA, were given, if it is metabolite of the microorganism containing the enzyme equipped with the capacity which decomposes the nonaqueous solubility component in organic sludge, such as protein, a lipid, a carbohydrate, and a cellulose, it will be thought that the purpose of this invention can be attained.

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[Translation done.]

## EXAMPLE

[Example] An example is given to below and this invention is concretely explained to it.

[0016] Example of creation of culture medium ..... Culture medium \*\*Manox112 \* 6g poly peptone 12g yeast extract 6g sodium chloride 3g phosphoric-acid hydrogen potassium 3g distilled water 270g\* U.S. Osprey trade name (Pseudomonas Putida and Pseudomonas Fluorescens)

The above-mentioned constituent which sterilized the culture medium beforehand was taught to the glass culture bottle (mini fur mentor) with an agitator of 500ml of inner capacity, sterilization air was introduced, and it cultivated for four days by 29-degreeC under churning. Centrifugal separation of this culture medium was carried out, the fungus body was removed, and the supernatant liquid was further filtered with the noodle plan filter. Through and 10,000 or less-cut off molecular weight culture medium-\*\* were obtained for the ultrafiltration equipment.

[0017]

[Example 1] A sewage disposal plant excess sludge (PH=4.63 and SS= — 14580 ppm) T. An alkali level 1010, 77.6% of organic substance, and 22.4% of inorganic substances are extracted to 200.00g beaker S.=1.65%. 10.00g (Control is 10.00g about distilled water) addition of the culture medium \*\* is carried out. They are after 24-hour neglect and 0.1% polymer coagulant water solution (K-53 ps of KONAN flocks) at 20-degreeC. 60.00g 100 mol % of methacrylic ester was added, it filtered [ by the three one motor ] after churning adjustment using No.1 made from ADVANTEC filter paper (90mm) for 3 minutes by 50r.p.m, and the filtrate weight and cake weight of 7 hours and 24 hours after were measured.

[0018] Next, the sludge processed similarly was measured to the centrifugation tube made from polypropylene at 40.00g accuracy, at-long-intervals alignment separation was carried out by 10000r.p.m with the centrifugal separator for 5 minutes, and the weight of a cake and a supernatant liquid was measured. (In this case, a polymer coagulant is not added)

[0019]

[Table 1]

(濾過データ)

	時間	ケーキ重量 (g)	濾液重量 (g)	備考
処理汚泥 (培養液①10g添加)	7 H	4 3 . 8	2 2 6 . 2	濾液は透明な 黄色に着色
	2 4 H	4 3 . 6	2 2 6 . 4	
Control汚泥 (蒸留水10g添加)	7 H	4 6 . 0	2 2 4 . 0	濾液は透明
	2 4 H	4 5 . 8	2 2 4 . 2	

[0020]

[Table 2]

(遠心分離データ)

	ケーキ重量 (g)	分離液重量 (g)	備考
処理汚泥 (培養液①10g添加)	4 . 5 7 1	3 5 . 4 2 9	分離液は透明 な黄色に着色
Control汚泥 (蒸留水10g添加)	4 . 9 0 1	3 5 . 0 9 9	分離液は透明

[0021]

[Example 2] B sewage disposal plant excess sludge (PH=7.57 and SS= — 13280 ppm) T. S.=1.6%, alkalinity =3850, organic substance =67.5%, Inorganic substance = Extract 32.5% to 200.00g beaker, and 10.00g (Control is 10.00g about distilled water) addition of the culture medium \*\* is carried out. They are after 24-hour neglect and 0.1% polymer coagulant water solution (K-53 ps of KONAN flocks) at 20-degreeC. 60.00g 100 mol % of methacrylic ester was added, it filtered [ by the three one motor ] after churning adjustment using No.1 made from ADVANTEC filter paper (90mm) for 3 minutes in 50r.p.m., and the filtrate weight and cake weight of 7 hours and 24 hours after were measured. Next, the sludge processed similarly was measured to the centrifugation tube made from polypropylene at 40.00g accuracy, at-long-intervals alignment separation was carried out in 10000r.p.m. with the centrifugal separator for 5 minutes, and the weight of a cake and a supernatant liquid was measured. (In this case, a polymer coagulant is not added)

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[Table 3]

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	時間	ケーキ重量 (g)	濾液重量 (g)	備考
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[Table 4]

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	ケーキ重量 (g)	分離液重量 (g)	備考
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[Translation done.]